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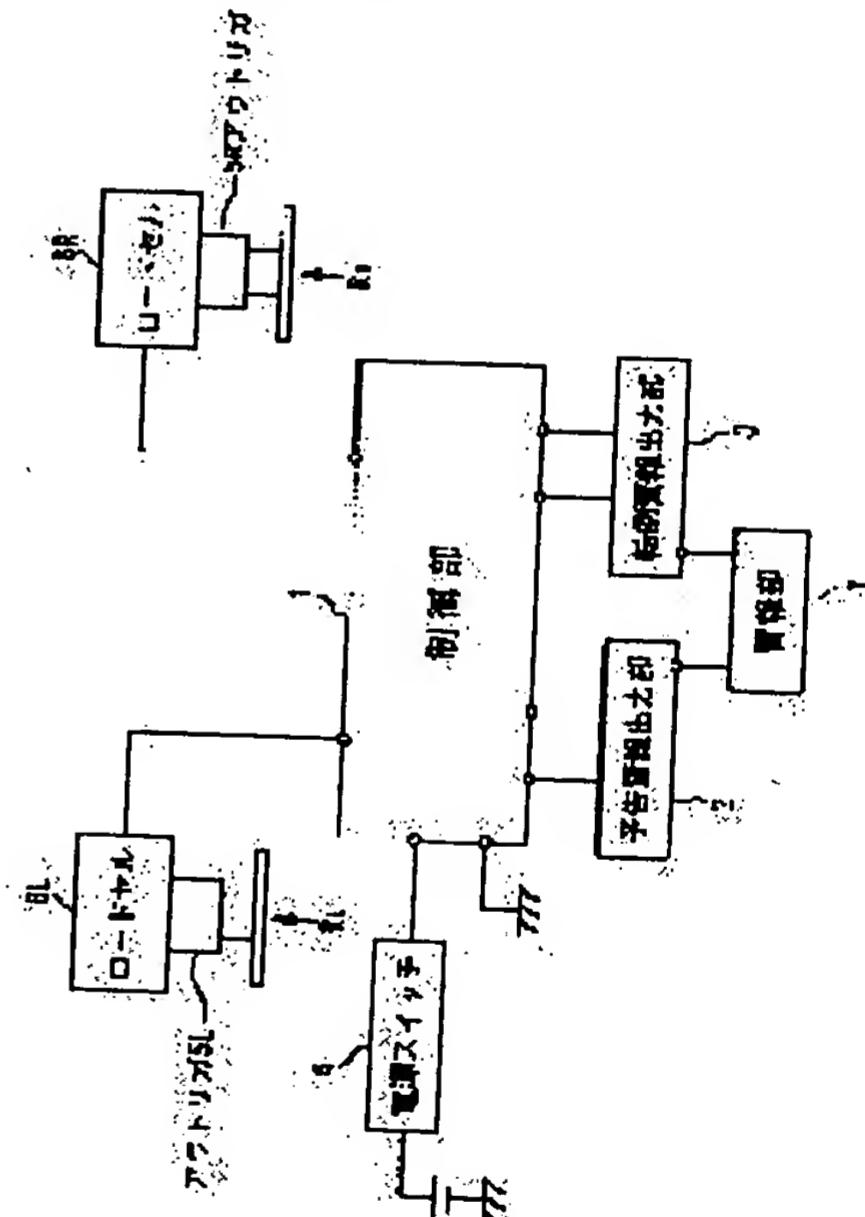
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## (54) CONTROLLER OF TUMBLE ALARM DEVICE FOR CRANE

### (57) Abstract:

**PROBLEM TO BE SOLVED:** To adequately and automatically control action of a tumble alarm device, in a tumble preventing device for a crane.

**SOLUTION:** A tumble preventing device for an on-vehicle crane, detecting a grounding load RL, RR of a right/left outrigger 5R, 5L by a load cell 6R, 6L to generate an alarm of tumble prevention from an alarm part 7 based on this detection value, comprises a warning alarm output part 2 feeding an alarm signal to the alarm part 7, a tumble alarm output part 3, and a control part 1 starting supervising of a tumble load when detection values of grounding load of the outrigger 5R, 5L after 0 point adjustment of the load cell 6R, 6L are both a start reference value or more, feeding a warning alarm signal from the warning alarm output part 2 when any one detection value comes into a range of a caution-required reference value, feeding a tumble alarm signal from the tumble alarm output part 3 when any one detection value is a hazard reference value or less, and ending supervising of the tumble load when both the detection values are smaller than a release reference value.



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## CLAIMS

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[Claim(s)]

[Claim 1] In the safety against overturning of the crane for car loading which detects the touch-down load of an outrigger on either side using a load cell, respectively, and emits the alarm for fall prevention from the alarm section based on the detection value of a touch-down load. The advance notice alarm-output section which sends out an advance notice alarm signal to the alarm section, and the fall alarm-output section which sends out a fall alarm signal to the alarm section. Each detection value of the touch-down load of an outrigger on either side performs zero-point adjustment of a load cell on either side at the time under of an adjustment reference value. When each detection value of the touch-down load of an outrigger on either side becomes beyond an initiation reference value, a fall load monitor is started. When the detection value of the touch-down load which acts on either of the outriggers on either side goes into the range of an important point alert level value, an advance notice alarm signal is sent out in the alarm section from the advance notice alarm-output section. When the detection value of the touch-down load which acts on either of the outriggers on either side becomes smaller than a risk reference value, a fall alarm signal is sent out in the alarm section from the fall alarm-output section. The control unit of the fall alarm of the crane characterized by having the control section which ends a fall load monitor when each detection value of the touch-down load of an outrigger on either side becomes smaller than a discharge reference value.

[Claim 2] on-off of the power take off of the car which is the source of power of a crane is interlocked with, and it is on-off. Control unit of the fall alarm of the crane according to claim 1 characterized by having the electric power switch carried out.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the control unit of the fall alarm of the crane which controls actuation of the fall alarm of a crane.

[0002]

[Description of the Prior Art] Generally the crane for car loading by which installation loading is carried out equips cars, such as a truck, with the outrigger, an outrigger on either side is jutted out and grounded at the time of a crane activity, and stability is secured. However, when suspended freight and an operating radius become excessive, there is a possibility that balance may collapse and a crane may fall. When a crane tends to fall to a left or the method of the right, with the direction to reverse, the touch-down reaction force of the outrigger of an opposite hand becomes small.

[0003] Then, in order to prevent fall accident, the touch-down load of an outrigger on either side is detected using a load cell at the time of an activity, and when the detection value of one touch-down load turns into below default value, the safety against overturning of the crane which emits an alarm is proposed. In addition, the crane for car loading has taken out the power of a hydraulic pump from the engine of a car through the power take off (PTO) as the source of power.

[0004]

[Problem(s) to be Solved by the Invention] The safety against overturning of a crane starts detection of a touch-down load with initiation of a crane activity. Although the touch-down load of one of right and left falls and it does not result in a fall promptly, if it will be in the important point caution condition that actuation takes caution, will emit an advance notice alarm and an operator's attention will be called. After emitting a fall alarm, preventing fall accident beforehand, if it will be in a risk condition of having drawn near with a possibility that a touch-down load may fall further and may result in a fall, and completing a crane activity, controlling to terminate detection of a touch-down load is desirable.

[0005] However, in the safety against overturning of the conventional crane, it did not have the control unit which can perform such control appropriately and automatically. This invention solves the above-mentioned problem in the fall alarm of a crane, detects the touch-down load of an outrigger on either side using a

load cell, and aims at offering the control unit of the fall alarm of the crane which can control actuation of a fall alarm appropriately and automatically in the safety against overturning of the crane which emits an alarm based on the detection value of a touch-down load.

[0006]

[Means for Solving the Problem] The control unit of the fall alarm of the crane of this invention In the safety against overturning of the crane for car loading which detects the touch-down load of an outrigger on either side using a load cell, respectively, and emits the alarm for fall prevention from the alarm section based on the detection value of a touch-down load The advance notice alarm-output section which sends out an advance notice alarm signal to the alarm section, and the fall alarm-output section which sends out a fall alarm signal to the alarm section, Each detection value of the touch-down load of an outrigger on either side performs zero-point adjustment of a load cell on either side at the time under of an adjustment reference value. When each detection value of the touch-down load of an outrigger on either side becomes beyond an initiation reference value, a fall load monitor is started. When the detection value of the touch-down load which acts on either of the outriggers on either side goes into the range of an important point alert level value, an advance notice alarm signal is sent out in the alarm section from the advance notice alarm-output section. When the detection value of the touch-down load which acts on either of the outriggers on either side becomes smaller than a risk reference value, a fall alarm signal is sent out in the alarm section from the fall alarm-output section. When each detection value of the touch-down load of an outrigger on either side becomes smaller than a discharge reference value, it has the control section which ends a fall load monitor.

[0007] Each detection value of the touch-down load of an outrigger on either side performs zero-point adjustment of a load cell on either side at the time under of an adjustment reference value, and this control unit starts a fall load monitor, when each detection value of the touch-down load of an outrigger on either side becomes beyond an initiation reference value. When the touch-down load which acts on either of the outriggers on either side falls during a crane activity and the detection value of a touch-down load goes into the range of an important point alert level value, an advance notice alarm emits, and when the touch-down load which acts on either of the outriggers on either side falls further and the detection value of a touch-down load turns into below a risk reference value, the fall alarm of a crane controls automatically to emit a fall alarm.

[0008] Therefore, an operator's attention can be called, fall accident can be prevented beforehand, and the safety of a crane activity can be raised. If each detection value of the touch-down load of an outrigger on either side turns into below a discharge reference value, a fall load monitor will be ended. Moreover, on-off of PTO of the car which is the source of power of a crane It interlocks and is on-off. By having the electric power switch carried out, control of the fall alarm of a crane is interlocked with the activity of a crane, and comes to be performed automatically.

[0009]

[Embodiment of the Invention] Drawing 1 is the block diagram of the control unit of the fall alarm of the crane which is one gestalt of operation of this invention. This control device is equipped with a control section 1, the advance notice alarm-output section 2, the fall alarm-output section 3, and an electric power switch 4. In the outriggers 5L and 5R of right and left of the crane for car loading, they are the touch-down load RL and RR. The load cells 6L and 6R for detecting are formed, and they are the touch-down load RL and RR. Detection data are sent to a control section 1 from load cells 6L and 6R.

[0010] The adjustment reference value with which a control section 1 serves as criteria of necessary decision, an initiation reference value, an important point alert level value, It has the microprocessing unit (MPU) which memorizes criteria data and control programs, such as a risk reference value and a discharge reference value. The touch-down load RL of the outriggers 5L and 5R on either side, and RR Each detection value performs zero-point adjustment of a load cell on either side at the time under of an adjustment reference value. When the outriggers 5L and 5R on either side ground and each of touch-down loads RL and detection values of RR becomes beyond an initiation reference value, a fall load monitor is started. Moreover, touch-down load RL which acts on either of the outriggers 5L and 5R of right and left during an activity Or touch-down load RR When it goes into the range of an important point alert level value, an advance notice alarm signal is sent out in the alarm section 7 from the advance notice alarm-output section 2. Touch-down load RL which acts on either of the outriggers 5L and 5R on either side Or touch-down load RR When it becomes below a risk reference value, a fall alarm signal is sent out in the alarm section 7 from the fall alarm-output section 3. The touch-down of the outriggers 5L and 5R on either side is canceled, and they are the touch-down load RL and RR. If each detection value turns into below a discharge reference value, a fall load monitor will be ended.

[0011] If the alarm section 7 emits an advance notice alarm in response to an advance notice alarm signal and a fall alarm signal is received, it will emit a fall alarm. Although alarm MESSE&JI with an alarm, an alarm lamp, the alarm display to a display, and voice etc. is independent for an alarm or can compound and use the means of arbitration for it, a buzzer is used for the alarm section 7 here, and a continuation sound is emitted as an intermittent tone and a fall alarm as an advance notice alarm.

[0012] An electric power switch 4 is on-off of PTO of the car which is the source of power of a crane. It interlocks and is on-off. It is constituted so that it may be carried out. In doing a crane activity with the crane for car loading, after stopping a car by the work site and starting actuation of a hydraulic pump by setting PTO of a car to ON, the outriggers 5L and 5R on either side are jutted out and grounded, and a crane is operated after securing stability.

[0013] Drawing 2 is the flow chart showing an example of the control condition of the fall alarm at the time of an activity. If PTO of a car is turned ON, since this will be interlocked with and an electric power switch 4 will be set to being turned on, a control unit also starts control. First, before the outriggers 5L and 5R on either side ground, zero-point adjustment of a load cell is performed automatically.

That is, when a power source is turned on [ it ], they are the touch-down load RL of the outriggers 5L and 5R on either side, and RR. If each detection value is under an adjustment reference value (300Ns), the loaded condition at that time is set up within 5 seconds with 0 N (RL =RR =0N).

[0014] If the outriggers 5L and 5R on either side are jutted out and grounded, they are the touch-down load RL and RR. It increases. The touch-down load RL of the outriggers 5L and 5R on either side, and RR A fall load monitor is started from the event of each detection value becoming beyond an initiation reference value (300Ns). At this time, activity initiation is told with the buzzer output for 5 seconds. In addition, while it is in the condition which the outriggers 5L and 5R on either side grounded, it is once off about PTO of a car. When carrying out and a power source is turned on [ it ], they are the touch-down load RL of the outriggers 5L and 5R on either side, and RR. Since each detection value is size from 300 Ns, in such a case, zero-point adjustment is not performed, but a fall load monitor is started promptly.

[0015] In the condition that the outriggers 5L and 5R on either side are grounded, and the crane activity is done, they are usually the touch-down load RL and RR. The detection value is 3000Ns or more. Touch-down load RL which acts on either of the outriggers 5L and 5R of right and left during an activity Or touch-down load RR If a detection value falls and it goes into the range of an important point alert level value (300Ns or more, 2000Ns or less), since a control section 1 will send out an advance notice alarm signal in the alarm section 7 from the advance notice alarm-output section 2, the alarm section 7 emits the intermittent tone of a buzzer as an advance notice alarm.

[0016] The touch-down load RL which acts on the outriggers 5L and 5R on either side, and RR If it returns to the stability side which all exceeds 2000 Ns, an advance notice alarm will be stopped. Touch-down load RL which acts on either of the outriggers 5L and 5R on either side Or touch-down load RR If a detection value falls further and becomes smaller than a risk reference value (300Ns), since a control section 1 will send out a fall alarm signal in the alarm section 7 from the fall alarm-output section 3, the alarm section 7 emits the continuation sound of a buzzer as a fall alarm.

[0017] The touch-down load RL which acts on the outriggers 5L and 5R of right and left during an activity, and RR When each detection value becomes smaller than a discharge reference value (300Ns) Since it is judged as that of which the touch-down of the outriggers 5L and 5R on either side was canceled, a control section 1 stops sending out of the fall alarm signal from the fall alarm-output section 3 to the alarm section 7, stops the continuation sound of the buzzer of the alarm section 7, and ends a fall load monitor.

[0018] If the outriggers 5L and 5R on either side are again jutted out and grounded from this condition, they are the touch-down load RL and RR. It increases and they are the touch-down load RL of the outriggers 5L and 5R on either side, and RR. If each detection value becomes beyond an initiation reference value (300Ns), a fall load monitor will be resumed. Actuation of a crane is ended, the touch-down of the outriggers 5L and 5R on either side is canceled and stored, and it is off about PTO of a car. If it carries out, this is interlocked

with and an electric power switch 4 is off. It becomes and a control unit also ends control.

[0019] In addition, values, such as the above-mentioned adjustment reference value, an initiation reference value, an important point alert level value, a risk reference value, and a discharge reference value, are examples, and can be suitably changed according to a specification, a service condition, etc. of a crane. This control device is on-off of PTO of the car whose electric power switch 4 is the source of power of a crane. It interlocks and is on-off. It is carried out. The touch-down load RL of the outriggers 5L and 5R on either side, and RR Each detection value performs zero-point adjustment of a load cell on either side at the time under of an adjustment reference value. The touch-down load RL of the outriggers 5L and 5R on either side, and RR When each detection value becomes beyond an initiation reference value, a fall load monitor is started. The touch-down load RL of the outriggers 5L and 5R on either side, and RR When each detection value turns into below a discharge reference value, a fall load monitor is ended and control of the fall alarm of a crane is performed automatically.

[0020] The touch-down load RL which acts on either of the outriggers 5L and 5R of right and left during a crane activity, Or touch-down load RR When it falls and goes into the range of an important point alert level value, an advance notice alarm is emitted. The touch-down load RL which acts on either of the outriggers 5L and 5R on either side, or touch-down load RR Since the fall alarm of a crane is automatically controlled to emit a fall alarm when it falls further and becomes below a risk reference value An operator's attention can be called, fall accident can be prevented beforehand, and the safety of a crane activity can be raised.

[0021] [Effect of the Invention] As explained above, the control unit of the fall alarm of the crane of this invention can detect the touch-down load of an outrigger on either side using a load cell, can control actuation of a fall alarm appropriately and automatically in the safety against overturning of the crane which emits an alarm based on the detection value of a touch-down load, and can raise the safety of a crane activity.

[0022] Moreover, on-off of PTO of the car which is the source of power of a crane It interlocks and is on-off. By having the electric power switch carried out, control of the fall alarm of a crane is interlocked with the activity of a crane, and comes to be performed automatically.

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

**[Drawing 1]** Drawing 1 is the block diagram of the control unit of the fall alarm of the crane which is one gestalt of operation of this invention.

**[Drawing 2]** It is the flow chart showing an example of the control condition of the fall alarm at the time of an activity.

**[Description of Notations]**

- 1 Control Section
- 2 Advance Notice Alarm-Output Section
- 3 Fall Alarm-Output Section
- 4 Electric Power Switch
- 5L, 5R Outrigger
- 6L, 6R Load cell
- 7 Alarm Section
- RL, RR Touch-down load

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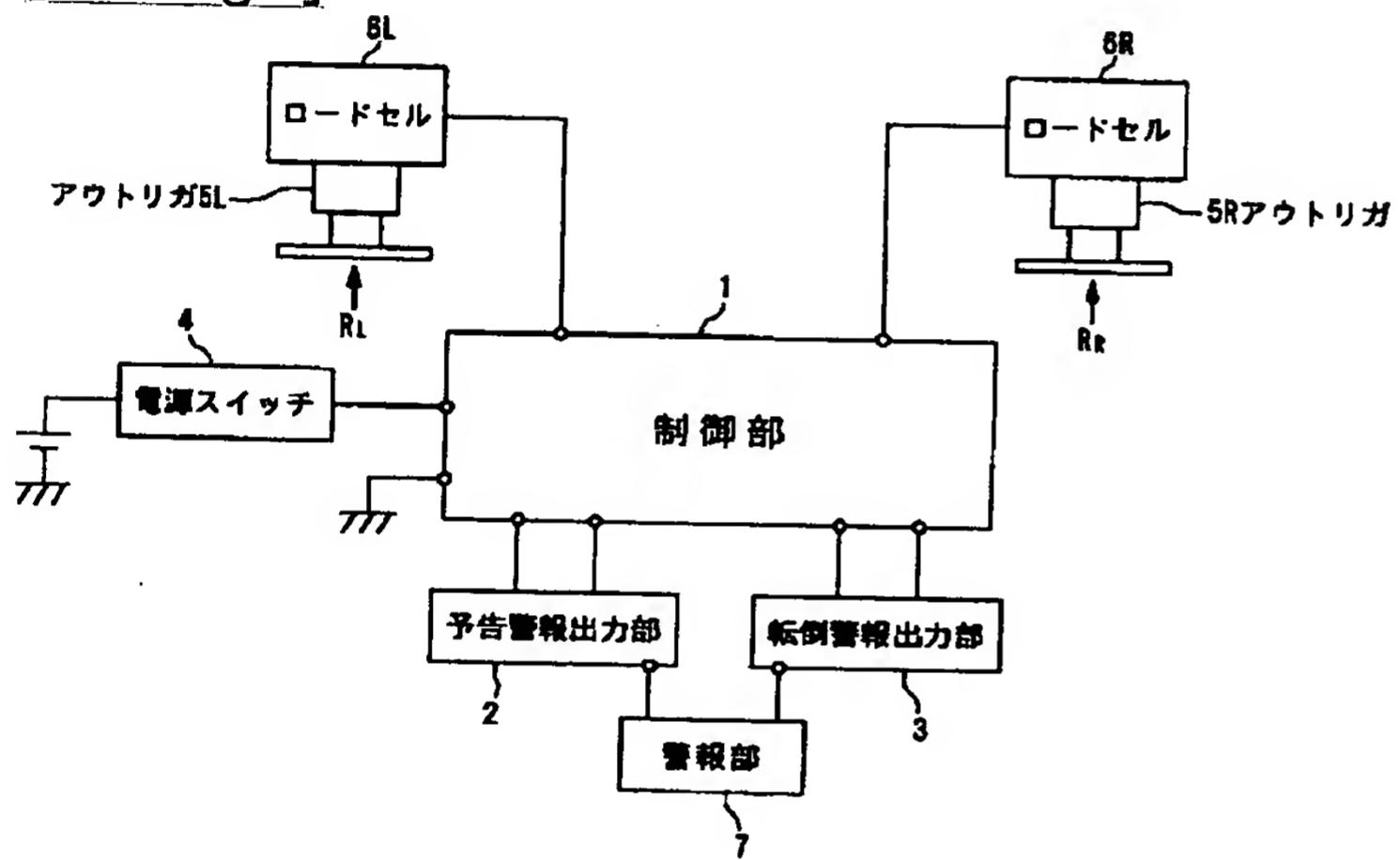
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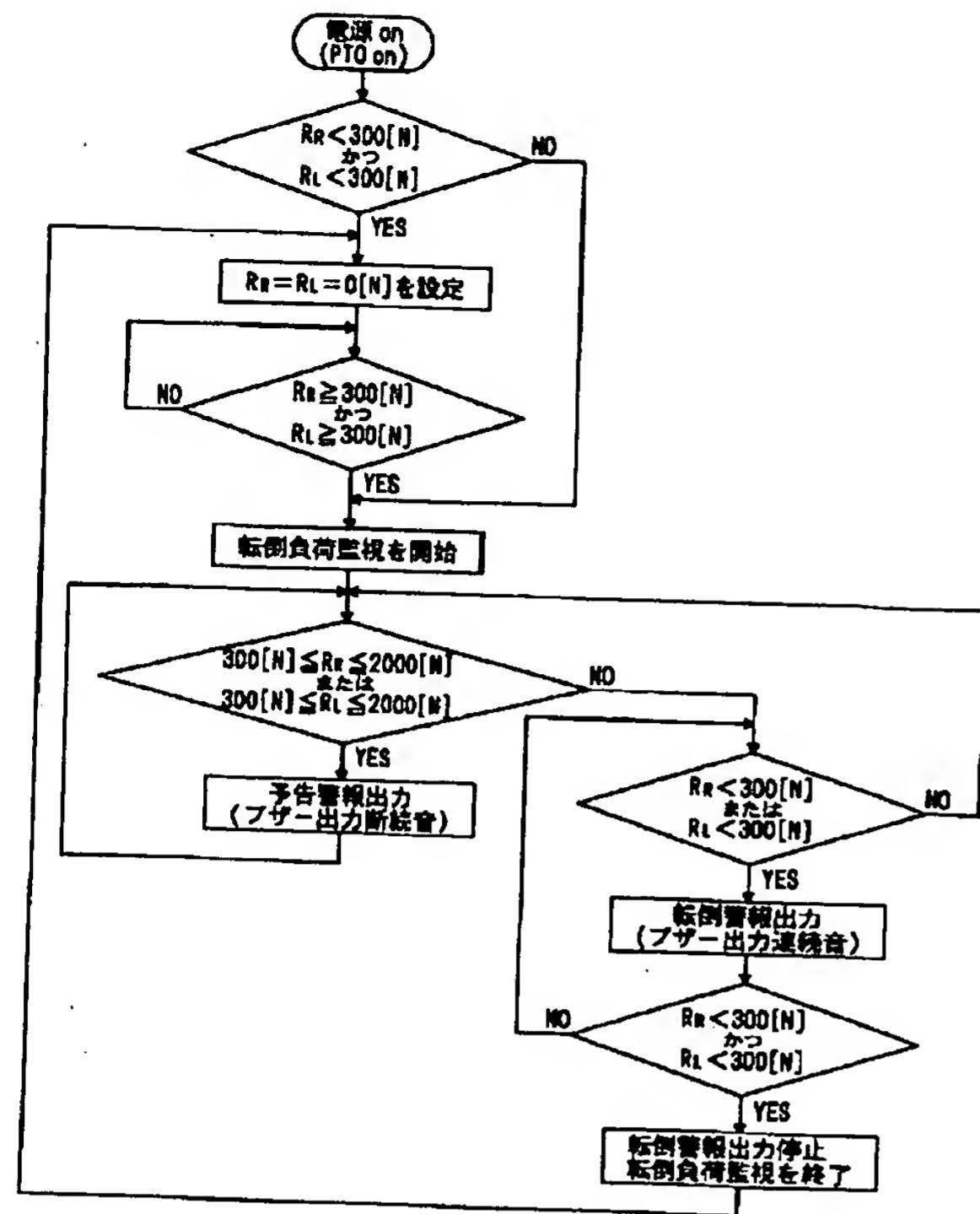
DRAWINGS

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[Drawing 1]



[Drawing 2]



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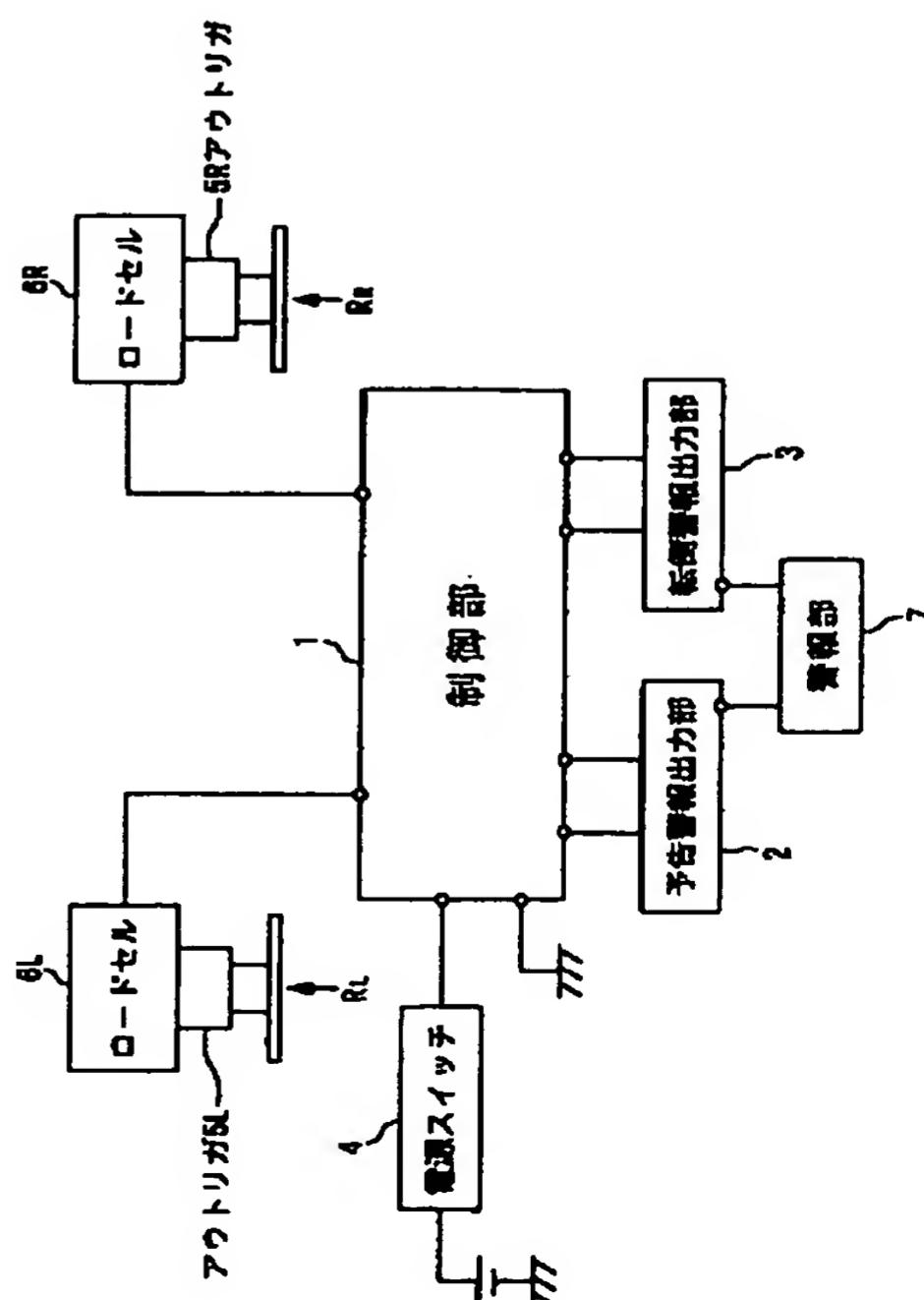
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### (54)【発明の名称】 クレーンの転倒警報装置の制御装置

#### (57)【要約】

【課題】 クレーンの転倒防止装置において、転倒警報装置の作動を適切かつ自動的に制御する。

【解決手段】 ロードセル6L、6Rで左右のアウトリガ5L、5Rの接地負荷RL、RRを検出し、その検出値に基づいて警報部7から転倒防止の警報を発する車両搭載用のクレーンの転倒防止装置において、警報部7に警報信号を送出する予告警報出力部2、転倒警報出力部3と、ロードセル6L、6Rの0点調整後アウトリガ5L、5Rの接地負荷の検出値が何れも開始基準値以上になると転倒負荷監視を開始し、何れか一方の検出値が要警戒基準値の範囲に入ると予告警報出力部2から予告警報信号を送出させ、何れか一方の検出値が危険基準値以下になると転倒警報出力部3から転倒警報信号を送出させ、検出値が何れも解除基準値より小さくなると転倒負荷監視を終了する制御部1とを備える。



## 【特許請求の範囲】

【請求項1】 ロードセルを用いて左右のアウトリガの接地負荷をそれぞれ検出し、接地負荷の検出値に基づいて警報部から転倒防止のための警報を発する車両搭載用のクレーンの転倒防止装置において、

警報部に予告警報信号を送出する予告警報出力部と、警報部に転倒警報信号を送出する転倒警報出力部と、左右のアウトリガの接地負荷の検出値が何れも調整基準値未満のとき左右のロードセルの0点調整を行い、左右のアウトリガの接地負荷の検出値が何れも開始基準値以上になったとき転倒負荷監視を開始し、左右のアウトリガの何れか一方に作用する接地負荷の検出値が要警戒基準値の範囲に入ったとき予告警報出力部から警報部に予告警報信号を送出させ、左右のアウトリガの何れか一方に作用する接地負荷の検出値が危険基準値より小さくなつたとき転倒警報出力部から警報部に転倒警報信号を送出させ、左右のアウトリガの接地負荷の検出値が何れも解除基準値より小さくなつたとき転倒負荷監視を終了する制御部とを備えたことを特徴とするクレーンの転倒警報装置の制御装置。

【請求項2】 クレーンの動力源である車両のパワーテイクオフのon-offと連動してon-offされる電源スイッチを備えたことを特徴とする請求項1記載のクレーンの転倒警報装置の制御装置。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】 本発明は、クレーンの転倒警報装置の作動を制御するクレーンの転倒警報装置の制御装置に関する。

## 【0002】

【従来の技術】 トラック等の車両に架装搭載される車両搭載用のクレーンは、一般にアウトリガを備えており、クレーン作業時には左右のアウトリガを張出して接地させ、安定を確保するようになっている。しかし、吊荷や作業半径が過大になると、バランスが崩れてクレーンが転倒するおそれがある。クレーンが左方又は右方に転倒しようとするときには、転倒する方とは反対側のアウトリガの接地反力が小さくなる。

【0003】 そこで、転倒事故を防止するため、ロードセルを用いて作業時に左右のアウトリガの接地負荷を検出し、一方の接地負荷の検出値が規定値以下になったとき警報を発するクレーンの転倒防止装置が提案されている。なお、車両搭載用のクレーンは、その動力源として油圧ポンプの動力を車両のエンジンからパワーテイクオフ(PTO)を介して取り出している。

## 【0004】

【発明が解決しようとする課題】 クレーンの転倒防止装置は、クレーン作業の開始に伴って接地負荷の検出を開始し、左右何れか一方の接地負荷が低下し、直ちに転倒には至らないが操作に注意を要する要警戒状態になると

予告警報を発してオペレータの注意を喚起し、接地負荷がさらに低下して転倒に至るおそれのある切迫した危険状態になると転倒警報を発して転倒事故を未然に防止し、クレーン作業が終了すると接地負荷の検出を終了させるよう制御することが望ましい。

【0005】 しかし、従来のクレーンの転倒防止装置では、このような制御を適切かつ自動的に行うことのできる制御装置を備えていなかった。本発明は、クレーンの転倒警報装置における上記問題を解決するものであつて、ロードセルを用いて左右のアウトリガの接地負荷を検出し、接地負荷の検出値に基づいて警報を発するクレーンの転倒防止装置において、転倒警報装置の作動を適切かつ自動的に制御することのできるクレーンの転倒警報装置の制御装置を提供することを目的とする。

## 【0006】

【課題を解決するための手段】 本発明のクレーンの転倒警報装置の制御装置は、ロードセルを用いて左右のアウトリガの接地負荷をそれぞれ検出し、接地負荷の検出値に基づいて警報部から転倒防止のための警報を発する車両搭載用のクレーンの転倒防止装置において、警報部に予告警報信号を送出する予告警報出力部と、警報部に転倒警報信号を送出する転倒警報出力部と、左右のアウトリガの接地負荷の検出値が何れも調整基準値未満のとき左右のロードセルの0点調整を行い、左右のアウトリガの接地負荷の検出値が何れも開始基準値以上になったとき転倒負荷監視を開始し、左右のアウトリガの何れか一方に作用する接地負荷の検出値が要警戒基準値の範囲に入ったとき予告警報出力部から警報部に予告警報信号を送出させ、左右のアウトリガの何れか一方に作用する接地負荷の検出値が危険基準値より小さくなつたとき転倒警報出力部から警報部に転倒警報信号を送出させ、左右のアウトリガの接地負荷の検出値が何れも解除基準値より小さくなつたとき転倒負荷監視を終了する制御部とを備えている。

【0007】 この制御装置は、左右のアウトリガの接地負荷の検出値が何れも調整基準値未満のとき左右のロードセルの0点調整を行い、左右のアウトリガの接地負荷の検出値が何れも開始基準値以上になったとき転倒負荷監視を開始する。クレーン作業中に左右のアウトリガの何れか一方に作用する接地負荷が低下して接地負荷の検出値が要警戒基準値の範囲に入ったときには予告警報を発し、左右のアウトリガの何れか一方に作用する接地負荷がさらに低下して接地負荷の検出値が危険基準値以下になったときには転倒警報を発するようクレーンの転倒警報装置を自動的に制御する。

【0008】 従って、オペレータの注意を喚起して転倒事故を未然に防止し、クレーン作業の安全性を向上させることができる。左右のアウトリガの接地負荷の検出値が何れも解除基準値以下になると転倒負荷監視を終了する。また、クレーンの動力源である車両のPTOのon-

off と連動してon-off される電源スイッチを備えることにより、クレーンの転倒警報装置の制御がクレーンの使用に連動して自動的に行われるようになる。

【0009】

【発明の実施の形態】図1は本発明の実施の一形態であるクレーンの転倒警報装置の制御装置の構成図である。この制御装置は、制御部1と、予告警報出力部2と、転倒警報出力部3と、電源スイッチ4とを備えている。車両搭載用のクレーンの左右のアウトリガ5L、5Rには、接地負荷RL、RRを検出するためのロードセル6L、6Rが設けられており、接地負荷RL、RRの検出データがロードセル6L、6Rから制御部1に送られる。

【0010】制御部1は、所要の判断の基準となる調整基準値、開始基準値、要警戒基準値、危険基準値、解除基準値等の基準データと制御プログラムを記憶するマイクロプロセッsingユニット(MPU)を備えており、左右のアウトリガ5L、5Rの接地負荷RL、RRの検出値が何れも調整基準値未満のとき左右のロードセルの0点調整を行い、左右のアウトリガ5L、5Rが接地して接地負荷RL、RRの検出値が何れも開始基準値以上になったとき転倒負荷監視を開始する。また、作業中に左右のアウトリガ5L、5Rの何れか一方に作用する接地負荷RLまたは接地負荷RRが要警戒基準値の範囲に入ったとき予告警報出力部2から警報部7に予告警報信号を送出させ、左右のアウトリガ5L、5Rの何れか一方に作用する接地負荷RLまたは接地負荷RRが危険基準値以下になったとき転倒警報出力部3から警報部7に転倒警報信号を送出させる。左右のアウトリガ5L、5Rの接地が解除されて接地負荷RL、RRの検出値が何れも解除基準値以下になると転倒負荷監視を終了する。

【0011】警報部7は、予告警報信号を受けて予告警報を発し、転倒警報信号を受けると転倒警報を発する。警報には、警音、警報ランプ、ディスプレイへの警報表示、音声による警報メッセージ等、任意の手段を単独で又は複合して用いることができるが、ここでは警報部7にブザーを用い、予告警報として断続音、転倒警報として連続音を発するようになっている。

【0012】電源スイッチ4はクレーンの動力源である車両のPTOのon-offと連動してon-offされるよう構成されている。車両搭載用のクレーンによってクレーン作業を行う場合には、車両を作業場所に停車させ、車両のPTOをonとして油圧ポンプの駆動を開始した後、左右のアウトリガ5L、5Rを張出して接地させ、安定を確保してからクレーンを操作する。

【0013】図2は作業時の転倒警報装置の制御条件の一例を示す流れ図である。車両のPTOをonにすると、これに連動して電源スイッチ4がonとなるので、制御装置も制御を開始する。まず、左右のアウトリガ5L、5Rが接地する前に、自動的にロードセルの0点調整を行

う。即ち、電源がonになったとき左右のアウトリガ5L、5Rの接地負荷RL、RRの検出値が何れも調整基準値(300N)未満なら、5秒以内にそのときの負荷状態を0N(RL=RR=0N)と設定する。

【0014】左右のアウトリガ5L、5Rを張出して接地させると接地負荷RL、RRが増加する。左右のアウトリガ5L、5Rの接地負荷RL、RRの検出値が何れも開始基準値(300N)以上になった時点から転倒負荷監視を開始する。このとき、5秒間のブザー出力により作業開始を知らせる。なお、左右のアウトリガ5L、5Rが接地した状態のまま、一旦車両のPTOをoffにしていたような場合には、電源がonになったとき左右のアウトリガ5L、5Rの接地負荷RL、RRの検出値は何れも300Nより大であるので、このような場合には0点調整は行わず、直ちに転倒負荷監視を開始する。

【0015】左右のアウトリガ5L、5Rが接地され、クレーン作業が行われている状態では、通常接地負荷RL、RRの検出値は3000N以上になっている。作業中に左右のアウトリガ5L、5Rの何れか一方に作用する接地負荷RLまたは接地負荷RRの検出値が低下し、要警戒基準値(300N以上、2000N以下)の範囲に入ると、制御部1は予告警報出力部2から警報部7に予告警報信号を送出させるので、警報部7は予告警報としてブザーの断続音を発する。

【0016】左右のアウトリガ5L、5Rに作用する接地負荷RL、RRが何れも2000Nを超える安定側に復帰すれば、予告警報は中止される。左右のアウトリガ5L、5Rの何れか一方に作用する接地負荷RLまたは接地負荷RRの検出値がさらに低下し、危険基準値(300N)より小さくなると、制御部1は転倒警報出力部3から警報部7に転倒警報信号を送出させるので、警報部7は転倒警報としてブザーの連続音を発する。

【0017】作業中に左右のアウトリガ5L、5Rに作用する接地負荷RL、RRの検出値が何れも解除基準値(300N)より小さくなったら場合は、左右のアウトリガ5L、5Rの接地が解除されたものと判断されるので、制御部1は転倒警報出力部3から警報部7への転倒警報信号の送出を中止して警報部7のブザーの連続音を停止させ、転倒負荷監視を終了する。

【0018】この状態から、再び左右のアウトリガ5L、5Rを張出して接地させると接地負荷RL、RRが増加し、左右のアウトリガ5L、5Rの接地負荷RL、RRの検出値が何れも開始基準値(300N)以上になれば転倒負荷監視を再開する。クレーンの操作を終了し、左右のアウトリガ5L、5Rの接地を解除して格納し、車両のPTOをoffにすると、これに連動して電源スイッチ4がoffとなり制御装置も制御を終了する。

【0019】なお、上記調整基準値、開始基準値、要警戒基準値、危険基準値、解除基準値等の値は一例であつて、クレーンの仕様や使用条件等によって、適宜変更す

ることができる。この制御装置は、電源スイッチ4がクレーンの動力源である車両のP T Oのon-offと連動してon-offされ、左右のアウトリガ5L、5Rの接地負荷RL、RRの検出値が何れも調整基準値未満のとき左右のロードセルの0点調整を行い、左右のアウトリガ5L、5Rの接地負荷RL、RRの検出値が何れも開始基準値以上になったとき転倒負荷監視を開始し、左右のアウトリガ5L、5Rの接地負荷RL、RRの検出値が何れも解除基準値以下になったとき転倒負荷監視を終了するようになっており、クレーンの転倒警報装置の制御は自動的に行われる。

【0020】クレーン作業中に左右のアウトリガ5L、5Rの何れか一方に作用する接地負荷RL、または接地負荷RRが低下して要警戒基準値の範囲に入ったときに予告警報を発し、左右のアウトリガ5L、5Rの何れか一方に作用する接地負荷RL、または接地負荷RRがさらに低下して危険基準値以下になったときには転倒警報を発するようクレーンの転倒警報装置を自動的に制御するので、オペレータの注意を喚起して転倒事故を未然に防止し、クレーン作業の安全性を向上させることができる。

#### 【0021】

【発明の効果】以上説明したように、本発明のクレーンの転倒警報装置の制御装置は、ロードセルを用いて左右

のアウトリガの接地負荷を検出し、接地負荷の検出値に基づいて警報を発するクレーンの転倒防止装置において、転倒警報装置の作動を適切かつ自動的に制御することができ、クレーン作業の安全性を向上させることができる。

【0022】また、クレーンの動力源である車両のP T Oのon-offと連動してon-offされる電源スイッチを備えることにより、クレーンの転倒警報装置の制御がクレーンの使用に連動して自動的に行われるようになる。

#### 【図面の簡単な説明】

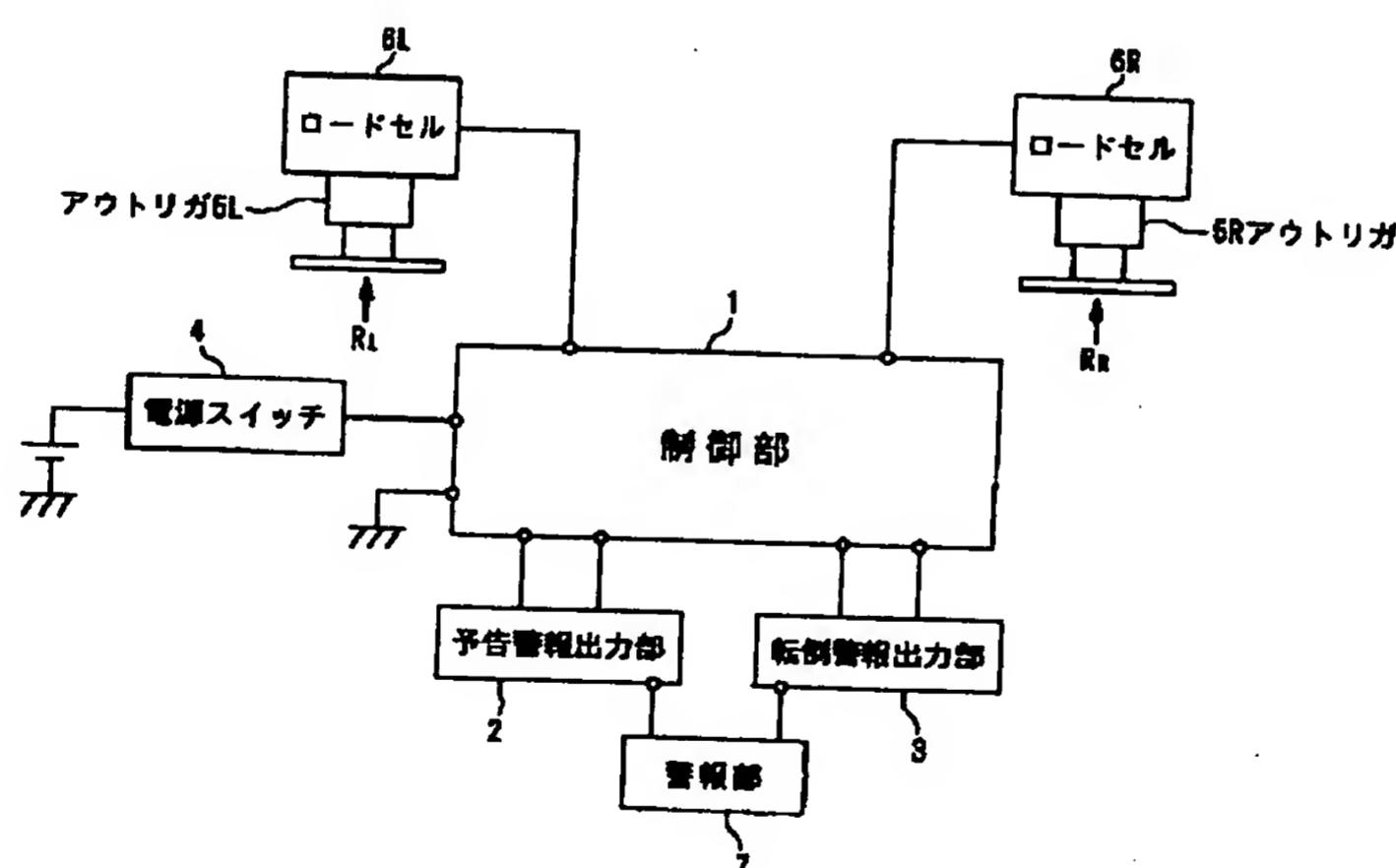
【図1】図1は本発明の実施の一形態であるクレーンの転倒警報装置の制御装置の構成図である。

【図2】作業時の転倒警報装置の制御条件の一例を示す流れ図である。

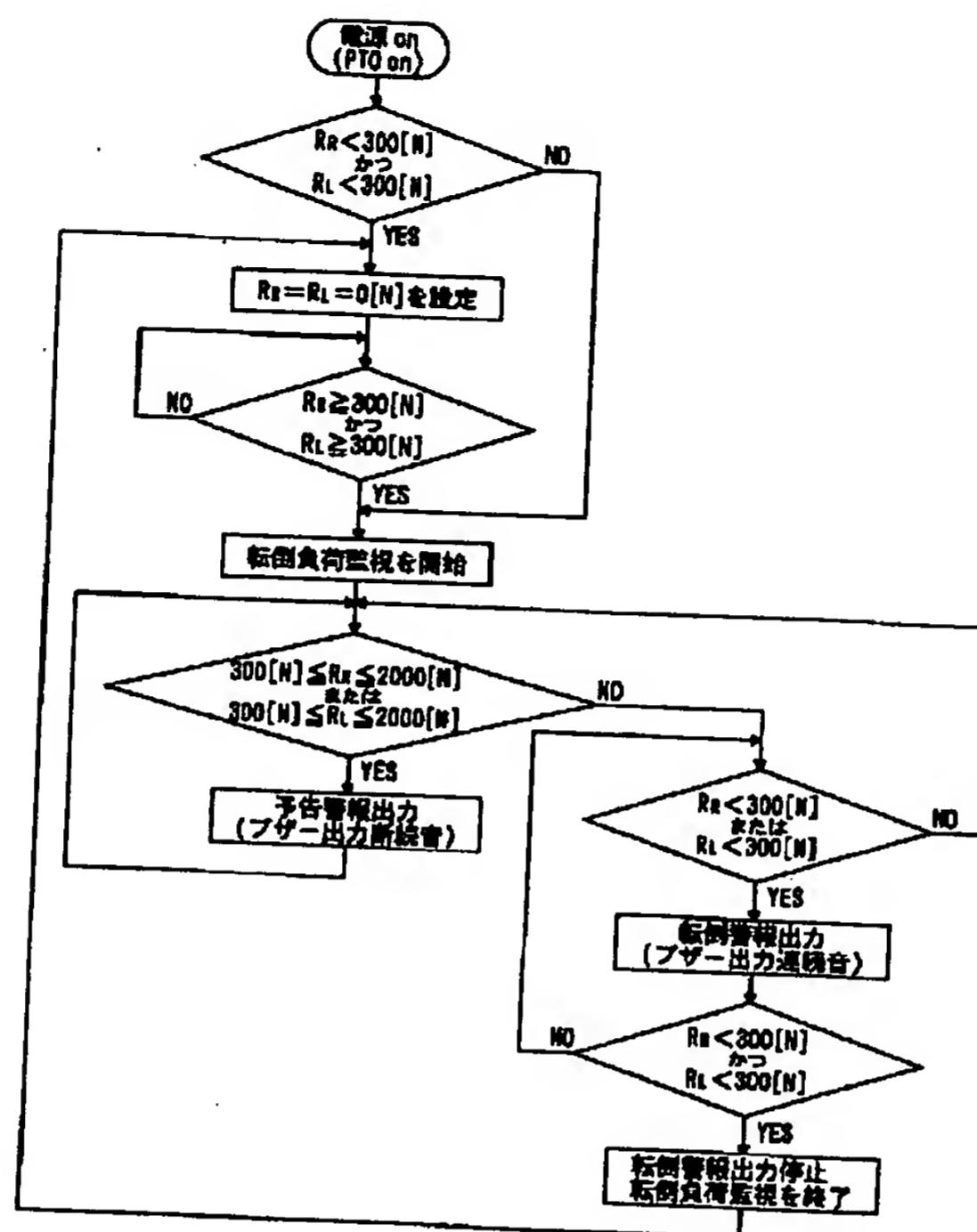
#### 【符号の説明】

1	制御部
2	予告警報出力部
3	転倒警報出力部
4	電源スイッチ
5L、5R	アウトリガ
6L、6R	ロードセル
7	警報部
RL、RR	接地負荷

【図1】



【図2】



フロントページの続き

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